

25 c/s REFERENCE PHASE GENERATOR

Type 3064

*(For use with V.H.F. Direction Finders
Types AD200 and AD210)*

Technical Handbook
Ref. T.3224

Marconi

MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED

*Chelmsford, Essex, England * Telephone: Chelmsford 3221 * Telex: 1953 * Telegrams: Expanse Chelmsford Telex*

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25 c/s REFERENCE PHASE GENERATOR TYPE 3064 (FOR USE WITH V.H.F. DIRECTION FINDERS TYPES AD200 AND AD210)

1 INTRODUCTION

The 25 c/s Reference Phase Generator Type 3064 has been designed as an ancillary to the VHF Direction Finding Equipment Types AD200 and the AD210 series.

The primary function of this unit is to aid the engineer in checking the accuracy of the phase comparison circuits and the instrumental error of the bearing indicator. It is useful for the alignment and setting-up of the circuits associated with the Reference and Signal voltages and when locating a fault in the equipment.

The generator unit supplies an output voltage from two separate generators coupled to a common motor shaft, the phase of one generator is adjustable to any degree of phase shift. Both outputs are obtainable across spring loaded terminals on the front panel and are connected into the AD200 equipment as described in this Handbook Section 6, and into the AD210 equipment as described in the Technical Handbooks associated with the equipment.

2 TECHNICAL SUMMARY

Input:	Mains input 230V, 40 - 60 c/s.			
Motor:	Synchronous type.			
Shaft speed:	According to the input supply frequency, 1500 RPM at 50 c/s input.			
Output:	A nominal output of 11 volts is obtainable from the generators at a frequency of 20 c/s, rising to 17 volts at 30 c/s, according to shaft speed.			
Phase Control:	Controls the degree of phase shift from the Variable phase generator.			
Scale:	A dial plate held in a clutch assembly and coupled to the phase control, indicates the degree of phase shift.			
Dimensions:	Height	Width	Length	Weight
(Overall)	10½ in.	11 in.	15 in.	18 lb.
	26.7 cm.	27.9 cm.	38 cm.	8.18 kg.

3 GENERAL DESCRIPTION

3.1 MECHANICAL

A component location diagram showing an exploded view of the generator unit is shown on Fig. 2. Constructed mainly of aluminium alloy the unit is light and robust and is carried by a handle attached to the top of the case.

A front panel assembly is attached to a frame assembly by six 2BA screws and the

whole may be withdrawn from its case for servicing by removing four 2BA retaining screws from the front panel.

Housed inside the case is a single-phase synchronous motor. Attached to one end of the motor shaft is the Reference Phase Generator and to the other end the Variable Phase Generator.

From each end of the variable-phase stator coil a connection is taken to a slip ring upon which a phosphor bronze brush impinges.

The slip ring assembly of the variable phase generator, complete with its stator winding, is attached to a phase control handle by three 4BA pillars secured to the bearing assembly. The whole assembly can then be rotated about the rotor (magnet) and adjusted in position to give any desired degree of phase shift.

Behind the front panel and clamped between a metal ring and the bearing assembly is a dial plate marked in degrees near the periphery. The plate is held in a clutch assembly between two felt friction rings, tension is applied by three phosphor bronze springs secured to the bearing assembly.

On the front panel are mounted, a perspex cursor, through which the scale reading can be observed, the Reference Phase Level Control (RV1) the Variable Phase Level Control (RV2), the Phase Control, a Finger Plate escutcheon and the Supply Panel. On the supply panel are five spring loaded terminals, the mains ON/OFF switch, fuse, and the mains input plug.

3.2 ELECTRICAL

A circuit and wiring diagram is shown on Fig.1.

The mains supply, 230 V 40 - 60 c/s, is fed to the synchronous motor from the mains input plug, in series with the mains fuse (1 amp)., and the ON/OFF switch.

The synchronous motor has a speed of 1500 RPM when the supply frequency is 50 c/s, subsequently if the frequency of the supply is 40 c/s the shaft speed is reduced to 1200 RPM and increased to 1800 RPM at 60 c/s. At these speeds the output from both generators is approximately 11 volts at 20 c/s and increases to 17 volts at 30 c/s, the nominal output being 14 volts at 25 c/s for a shaft speed of 1500 RPM.

The output from the Reference Generator is fed from the stator winding by two leads (pink and grey) to RV1, a 5 k Ω potentiometer situated on the top left-hand corner of the front panel marked REFERENCE. The adjustment of this control varies the output voltage level at 25 c/s from 0 - 14 volts. From RV1 the output is then obtained across two spring loaded terminals marked R1 and R2, for reference, on the front panel of the unit.

The output from the Variable Generator is fed in a similar manner from the brush block, by two leads (orange and brown), to RV2 a 5 k Ω potentiometer situated on the top right-hand corner of the unit and marked VARIABLE. The output is adjustable from 0 - 14 volts at 25 c/s and is obtained across two spring loaded terminals marked V1 and V2.

4 SETTING UP THE VARIABLE PHASE GENERATOR

The Reference and Variable phase supply is fed into the VHF D/F equipment as described in section 6 for the AD200, and in the appropriate Technical Handbook for the AD210 equipment.

The output from the variable phase generator is adjusted in phase by rotating the phase handle manually, either in a clockwise, or anticlockwise direction. Zero phase

adjustment is obtained by aligning the zero datum line of the phase control with a line on the front panel, see Fig.2. Some degree of phase displacement will be in evidence between the zero setting of the phase control and the reading taken up by the Decometer in the Display Unit. To align the dial plate of the variable Phase Generator a finger plate is provided which allows free access for a finger to engage one of the four holes in the plate. The plate is held by the finger while the phase control is rotated by hand until the pointer of the Decometer in the Display Unit is aligned with the setting of the scale reading. To obtain a fine adjustment on the final setting the phase control is held by hand while the dial plate is moved with the aid of the finger to the desired setting.

Note:- *In the event of the phase handle being removed, care should be exercised in replacing. The line on the phase handle should correspond with a spot of paint on the hexagon pillar, which should also align with the start of the stator winding.*

5 MAINTENANCE

Note:- *All bearing surfaces inside the Stator Housing have been coated with grease XG-275, specification DTD825 DEF 5000. Attention should be given to these surfaces during a major inspection and a fresh application of grease applied after cleaning.*

5.1 ACCESS TO THE FRONT AND REAR BEARINGS (STATOR HOUSING)

1. Unscrew the four retaining screws from the front panel and withdraw the generator assembly from its case. This will expose the bearing assembly behind the front panel.
2. Apply a thin lubricating coat to the front and rear bearings, through the oil lubricating holes provided on top of the bearing case.

5.2 ACCESS TO THE SLIP RING AND BEARING SURFACES

1. Unsolder the leads connecting the front panel assembly to the frame assembly.
These are as follows:-
A pink and grey from RV1 to the connecting pins on the frame assembly.
Orange and Brown leads from RV2 to the frame assembly.
Red lead to the capacitor terminal on the lower part of the frame assembly.
Blue lead to connecting pin, also on the lower part of the frame assembly.
2. Remove the slip ring assembly retaining screw.
3. Remove the screws securing the brush block to the assembly casing, and also remove the screws and nuts securing the two halves of the brush block together, leaving the phosphor bronze brush free to be lifted away from the brush-housing.
4. Unscrew the six counter-sunk screws securing the front panel assembly to the frame assembly. The front panel complete with the slip ring assembly can then be withdrawn away from the main frame.
5. Clean the metal surface of the slip rings and brushes, if necessary, with crocus paper and apply a thin coating of petroleum jelly.
Clean all bearing surfaces inside the Stator Housing and apply a fresh coating of grease.
Re-assemble in reverse order.

5.3 SYNCHRONOUS MOTOR

The shaft bearings of the synchronous motor are pre-packed with grease on assembly. According to the use and time elapsed between maintenance attention should be given to these bearings. Access to the bearings is obtained as in Section 5.2, 1 to 4. Then

- a) Remove the Variable Generator Housing and the Reference Generator from the motor frame.
- b) Uncover the bearing by removing the plate from both ends of shaft and apply a coating of grease.

6 USING THE 25 c/s REFERENCE PHASE GENERATOR WITH THE AD200 V.H.F. D/F EQUIPMENT

Note:- The following instructions are to be read in conjunction with the Technical Handbook Ref. T.2484/2, Section 7.6.12 (Display Unit Local Equipment) and Section 7.6.13 (Display Unit Remote Equipment).

6.1 GAIN OF PHASE COMPARISON CIRCUIT (LOCAL CONSOLE)

See Technical Handbook Ref. T.2484/2, Section 7.6.12, page 59.

The 25 c/s Reference Phase Generator is connected to the local equipment as follows:-

- (a) Variable Phase Output - Connect V1 to tag 16 (channel 1) or tag 17 (channel 2).
- Connect V2 to earth.
- (b) Reference Phase Output - Connect R1 and R2 to pins 1 and 2 of the Aerial socket, or (tags 18 and 19 on the Display chassis).

The 25 c/s reference signal control may be left in its normal position.

Connect a Valve Voltmeter across the primary winding of the phase - splitting transformer T_R , (see Fig. 6 Technical Handbook Ref. T.2484/2, and adjust the Reference Phase Level Control (RV1) on the front panel of the 25 c/s Reference Generator to produce 11 volts.

Transfer the Valve Voltmeter across to the primary winding of the transformer T_S (Fig. 6), and adjust the Variable Phase Level Control (RV2) on the 25 c/s Reference Generator to produce 11 volts.

Align the pointer of the Decometer to zero by rotating the phase control handle of the Variable Phase Generator. Owing to a phase displacement existing between the input from the 25 c/s Reference Phase Generator and the Decometer, the zero datum line on the phase handle will not correspond with this setting. Check the voltage levels given in tables 53 and 54 of the Technical Handbook.

6.2 PHASE CHECKS (LOCAL CONSOLE)

Set the Phase Control to the mid-position on the local Display console.

Zero phase align the output from the 25 c/s Reference Phase Generator, by rotating the phase handle until the zero datum line corresponds with the line on the front panel.

The pointer of Decometer should take up a reading between $110-130^{\circ}$.

Check this reading on channel 1 and channel 2 and record both readings for future reference.

If this reading is incorrect a further check can be made by transferring the reference input, from pins 1 and 2 of the Aerial socket or tags 18 and 19 of the Display chassis, into the selective amplifier. Connect R1 to pin 7 of the Reference Selective Amplifier, and connect R2 to earth.

Readjust the output control (RV1) on the 25 c/s Reference Generator to produce 11 volts across the primary winding of transformer T_R .

The Decometer should read between $190^\circ - 210^\circ$.

6.3 INSTRUMENTAL ACCURACY (LOCAL CONSOLE)

Align the pointer of the Decometer to the zero setting by means of the phase handle on the 25 c/s Reference Generator, and set the dial plate to align with the Decometer reading as described in section 4.

Measure the error of the Decometer reading by rotating the phase control handle of the 25 c/s Reference Generator in 10 steps. The maximum error should not exceed $\pm 2\frac{1}{2}^\circ$.

6.4 GAIN OF PHASE COMPARISON CIRCUIT (REMOTE CONSOLE)

See Technical Handbook Ref. T.2484/2 section 7.6.13, page 66.

The 25 c/s Reference Phase Generator is connected to the Remote equipment as follows:-

- (a) Variable Phase Output - Connect V1 to the junction of R17 ($39\text{ k}\Omega$) and C13 ($0.01\text{ }\mu\text{FD}$)
Underside tag board of Display Unit.
(see Fig. 57 Technical Handbook Ref. T.2484/2).
- Connect V2 to earth.
- (b) Reference Phase Output - Connect R1 to the junction of R8 ($22\text{ k}\Omega$) and C5 ($0.05\text{ }\mu\text{FD}$).
Underside tag board of Display Unit (see Fig. 57).
- Connect R2 to earth.

Continue as for the Local Display, Section 6.1, by connecting a Valve Voltmeter across the primary winding of transformer T_R and T_S (see Fig. 8), and adjust RV1, and RV2 on the front panel of the 25 c/s Reference Phase Generator to produce 11 volts.

Align the pointer of the Decometer to zero with the phase handle of the variable phase generator, as described in section 6.1.

Check the voltage levels given in Table 62 of the Technical Handbook.

6.5 PHASE CHECKS (REMOTE CONSOLE)

Set the Phase Control to the mid-position on the Remote Display Console.

Zero phase align the output from the 25 c/s Reference Phase Generator, as described in section 6.2.

The pointer of the Decometer should read between $190^\circ - 210^\circ$.

6.6 INSTRUMENTAL ACCURACY (REMOTE CONSOLE)

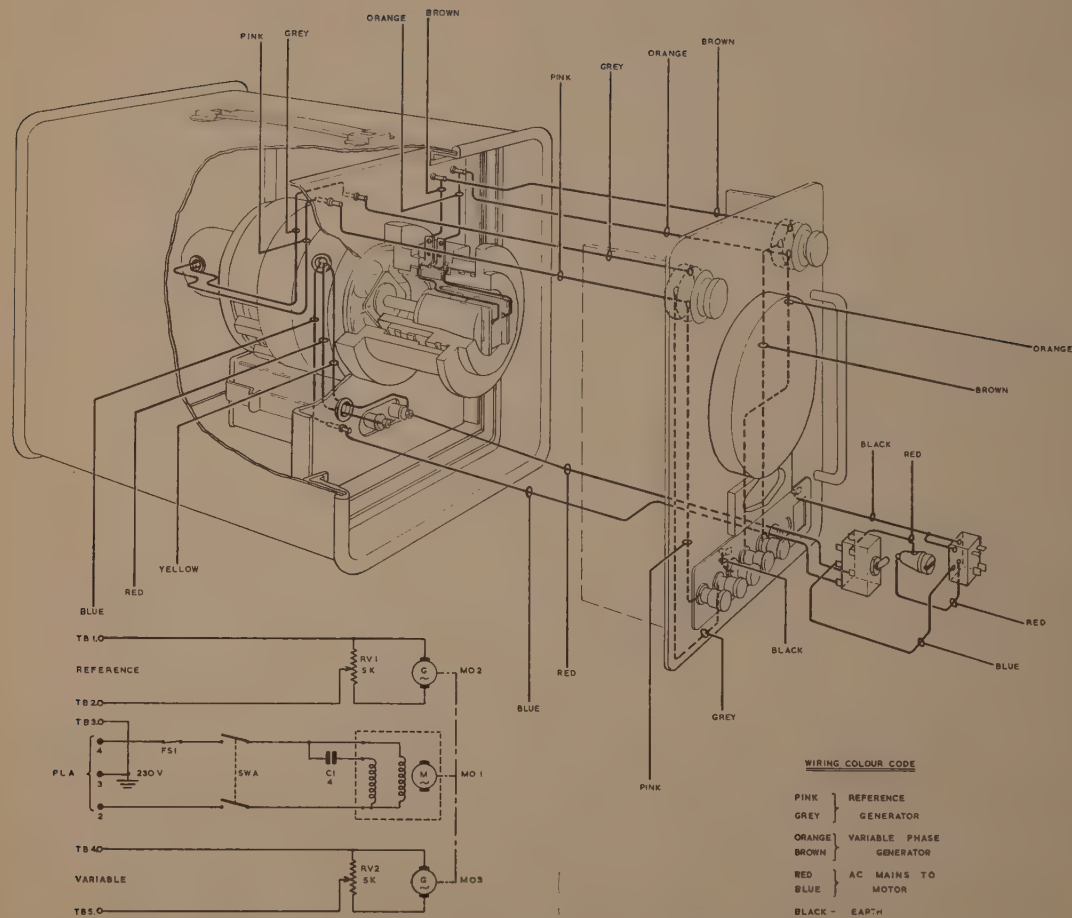
Align the pointer of the Decometer to the zero setting and measure the error of the Decometer reading as in Section 6.3.

Note:- Owing to the very low harmonic content in the output waveform from the 25 c/s Reference Phase Generator, the external 25 c/s selective amplifier, described on page 67 of the Technical Handbook will not be necessary.

COMPONENTS LIST
FOR
25 c/s REFERENCE PHASE GENERATOR TYPE 3064
(Drg. No. W.50173 Sh. 1.)

- Notes:—1 When ordering spares quote information from all columns for identities marked * or identity only for all other items.
- 2 The references in column 1 are shown on the circuit diagram Fig. 1 (WZ.16225/D Sh. 1) and component location diagram Fig. 2 (WZ.16226/D Sh. 1).
- 3 For identical items the total number is given at the first entry.

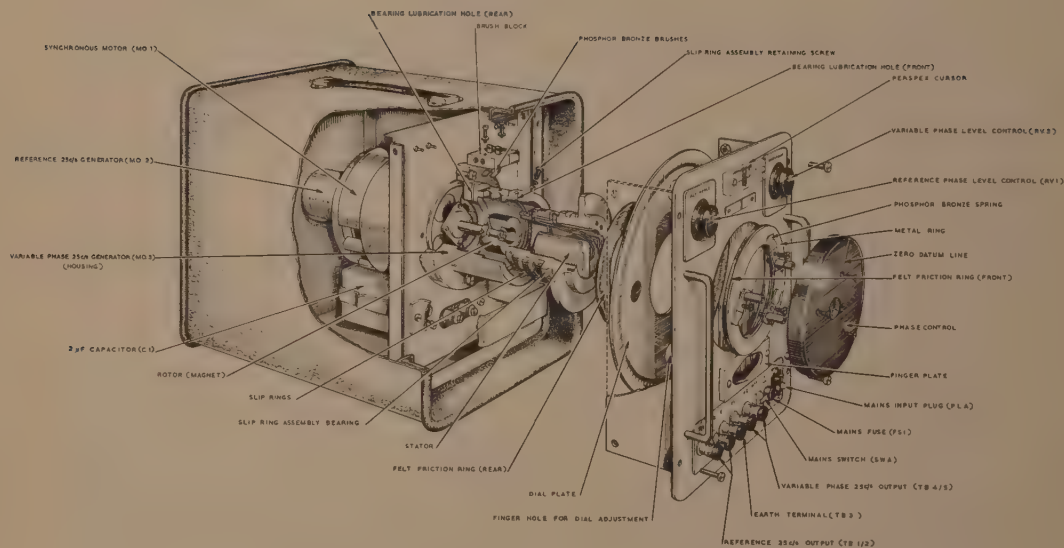
(1) Ref.	(2) Unit No.	(3) Description	(4) Value	(5) Tol. % ±	(6) Rating	(7) Complete Identity			(8) Total
						Standard	—	—	
						Drawing No.	Sh.	Ref/Ed	
C1		CAPACITORS Paper, Foil	2 μ F	20	800V	PC.19213/2			1
RV1		RESISTORS VARIABLE Comp. Linear	5k Ω		1/8W	PC.67205/10			2
RV2		Comp. Linear	5k Ω		1/8W	PC.67205/10			
		MISCELLANEOUS ELECTRICAL ITEMS							
FS1		Fuse, Cartridge			1 Amp	WIS.3981/C	1	6	1
MO1		Motor, Single Phase, Synchronous				WIS.6441/B	1	1	1
MO2		Generator consists of:- Housing				W.50180/B	1	1	1
		Stator				WIS.6537/C	1	1	1
		Rotor				WIS.6538/C	1	1	1
MO3		Generator consists of:- Housing				1/W.50179/B			1
		Stator				WIS.6537/C	1	1	1
		Rotor				WIS.6538/C	1	1	1
PLA		Plug, 4 pin				WIS.3737/C	1	6	1
SWA		Switch, Double Pole				PC.71302/2			1
TB1		Terminal, Spring Loaded				WIS.5541/C	1	1	5
TB2		Terminal, Spring Loaded				WIS.5541/C	1	1	
TB3		Terminal, Spring Loaded				WIS.5541/C	1	1	
TB4		Terminal, Spring Loaded				WIS.5541/C	1	1	



CIRCUIT AND WIRING DIAGRAM 25 c/s REFERENCE PHASE GENERATOR

TYPE 3064

WZ.16225/D Sh. 1 Iss. 1



COMPONENT LOCATION DIAGRAM 25 c/s REFERENCE PHASE GENERATOR

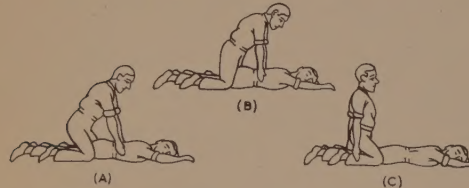
TYPE 3064

WZ.16226 D Sh. 1 Iss. 2

FIRST AID IN CASE OF ELECTRIC SHOCK.

SCHAEFER'S METHOD.

1. PROTECT YOURSELF with dry insulating material.
2. BREAK THE CIRCUIT by opening the power switch or by pulling (with due caution) the patient free of the live conductor. Don't touch patient with your bare hands until the circuit is broken.



3. LAY PATIENT ON STOMACH, one arm extended, the other bent at elbow. Turn face outward resting on arm or forearm.
4. REMOVE FALSE TEETH, TOBACCO or GUM from patient's mouth.
5. KNEEL, STRADDLING PATIENT'S THIGHS. (See A.)
6. PLACE PALMS OF YOUR HANDS ON PATIENT'S BACK with little fingers just touching the lower ribs.
7. WITH ARMS STRAIGHT, SWING FORWARD gradually bringing the weight of your body to bear upon the patient. (See B)
8. SWING BACKWARD IMMEDIATELY to relieve the pressure. (See C.)
9. AFTER TWO SECONDS, SWING FORWARD AGAIN. Repeat twelve to fifteen times per minute.
10. WHILE ARTIFICIAL RESPIRATION IS CONTINUED, HAVE SOMEONE ELSE :—
(a) loosen patient's clothing.
(b) send for a doctor.
(c) keep patient warm.
11. IF PATIENT STOPS BREATHING, CONTINUE ARTIFICIAL RESPIRATION; four hours or more may be required.
12. DO NOT GIVE LIQUIDS UNTIL PATIENT IS CONSCIOUS.

SYLVESTER'S METHOD.

To be used only when facial or suspected internal injuries (due to patient falling) render the Schaefer method inadvisable.

1. CALL FOR ASSISTANCE.
DONT TOUCH PATIENT WITH BARE HANDS until circuit is broken.
2. ADJUST PATIENT'S POSITION. Instantly place the patient on on his back on the floor. Loosen tight clothing, remove false teeth, raise and support patient's shoulders on a small firm cushion placed under the shoulder blades.
3. MAINTAIN FREE PASSAGE OF AIR INTO THE WINDPIPE. Assistant must hold patient's tongue forward with handkerchief to prevent tongue blocking air passage.
4. IMITATE BREATHING MOVEMENTS.

A. Induce aspiration.

Kneel behind patient's head, grasp his forearms just below the elbows; draw arms upwards, outwards, and then towards you, making the elbows touch the ground.



B. Induce expiration.

Bring patient's flexed arms slowly forwards, downwards and inwards, pressing the arms and elbows on sides of chest, each side of breast bone.



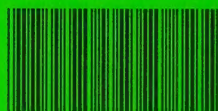
C. Continue A and B.

Repeat A and B movements alternately, deliberately and perseveringly about 12 times a minute. The rhythm is :— 2 seconds pressure, 3 seconds relaxation.

5. WHEN NATURAL BREATHING BEGINS, regulate the movements to correspond with it. Also, to promote circulation, rub the limbs vigorously towards the heart and apply warmth.
6. WATCH PATIENT CAREFULLY for some time to see that breathing does not fail again.
7. SHOULD BREATHING TEND TO WEAKEN OR STOP continue artificial respiration perseveringly until breathing is restored.



MP MASTER



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